

US EPA ARCHIVE DOCUMENT



Environmental Issue

Urban "heat islands" are created principally by man-made surfaces, including concrete, dark roofs, asphalt lots and roads, which absorb most of the sunlight falling on them and reradiate the energy as heat. Many urban streets have fewer trees and other vegetation to shade buildings, block solar radiation and cool the air by evapotranspiration. Higher summertime temperatures can result in increased levels of air pollutants and increased heat stress and other public health consequences for urban residents. However, there are still uncertainties involving the impacts of heat on vulnerable populations, the relationship between heat-related mortality to built environment and social risk factors, the impacts of urban form on creating elevated temperatures, and the best approach for specific municipalities dealing with these problems.

Study Area and Weather Analysis

The historical development of the NYC heat island effect was assessed in terms of average temperature differences of the city center (Central Park Station) relative to its surrounding 31-county metropolitan region, comprised of parts of NYS, New Jersey, and Connecticut. Monthly maximum and minimum temperatures for 1900-1997 were obtained from NOAA's National Climatic Data Center, the NASA-GISS, and the Lamont-Doherty Earth Observatory of Columbia Univ. for 24 weather stations within the region that are part of the U.S. Historical Climatology Network.

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- A difference of at least 1°C already existed at the early 1900's, and increased over the century.
- The UHI peaked in the 1950-1997 period.
- In general, the magnitude of the temperature difference varies with the distance to NYCP and with the time period considered.
- There was a significant decrease in the monthly and seasonal variability of the UHI effect over the century.

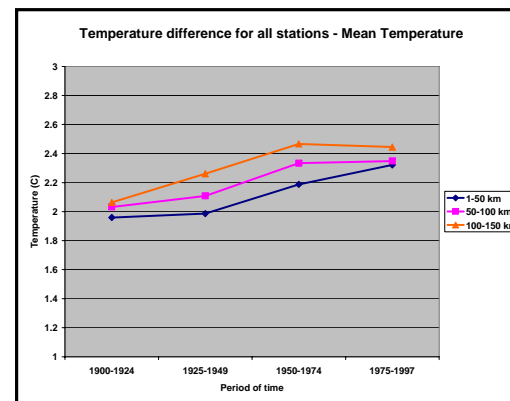
Urban Ecological Infrastructure



New living roof development proposed in Queens, NY:

What is the potential for mitigation of the urban heat island through strategies in the built environment?

Photo: K. Bakewell



- The ave. temperature differences between NYC Central Park and 23 regional stations.
- A heat island effect exists in NYC, with mean temperatures in the NYCP Station generally higher than the surrounding stations, ranging from 1.20° C to 3.02° C.

Discussion and Future Research

Research into the UHI effect presents opportunities to develop an integrated methodology for understanding the impacts of land use on surface temperatures and the urban airshed, and to explore options for management of environmental stressors to public health. My research will expand on existing analysis of the impacts of urban design on spatial distributions of temperature variability, analyze the corresponding air quality and health consequences of these spatial patterns, and advance methods for evaluating the use of ecological modifications in the built environment that may have multiple advantages for conserving peak electrical demand, and improving air quality and public health.

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